551

In Two Weeks: 40 Things for July 4th

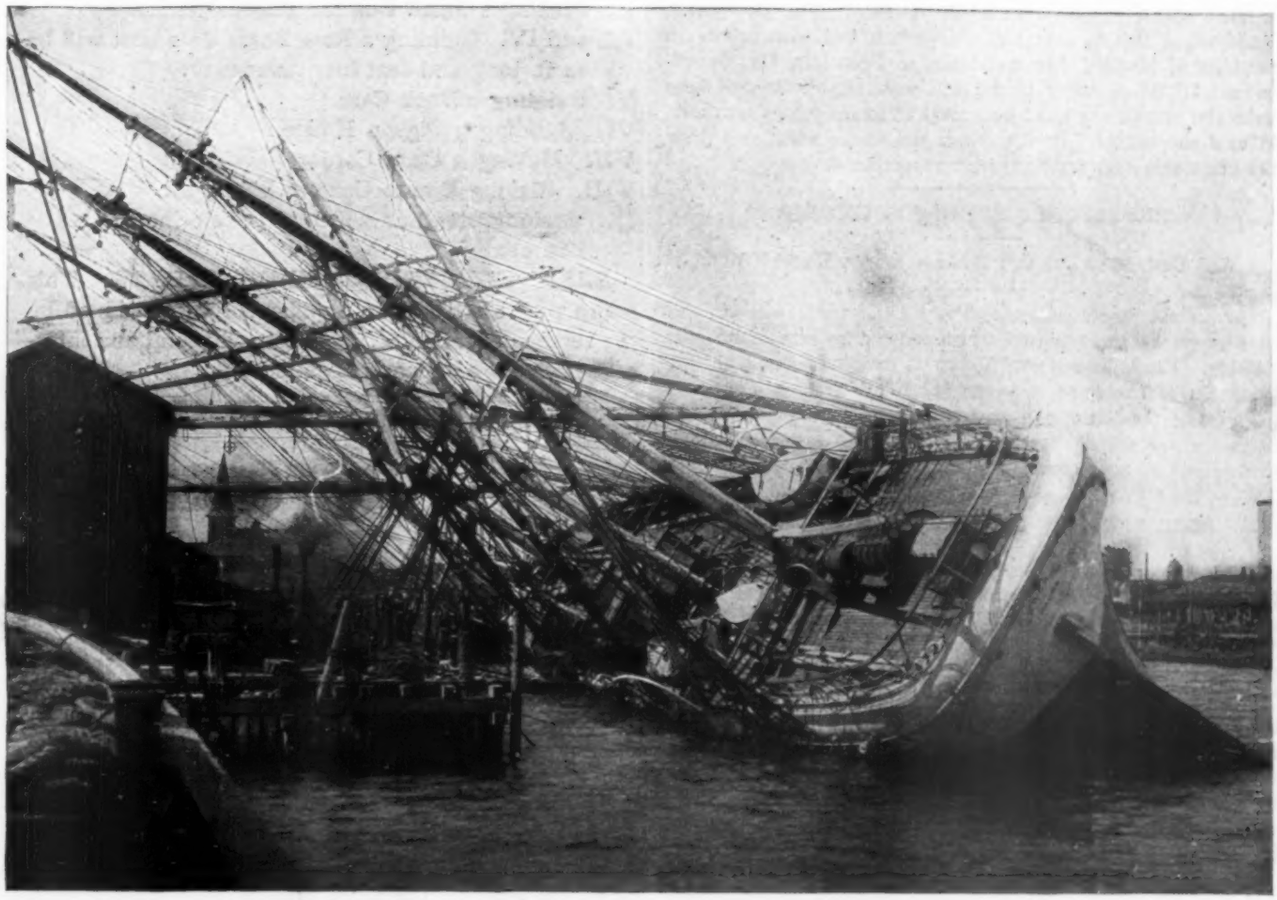
POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

TELLS YOU HOW TO DO THINGS. WRITTEN SO YOU CAN UNDERSTAND IT.

Vol. 1. No. 23. CHICAGO, JUNE 14, 1902. PRICE 5 CENTS.

BIG SHIP HOVE DOWN



British Steamer Yarkland at Pensacola, Fla.

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Announcement—Summer Course in Mechanics for Boys.
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52 Articles—29 Illustrations.

NEWSDEALERS SEE PAGE 368

FOR SALE BY ALL NEWSDEALERS.

LIBRARY OF CONGRESS JUN 12 1902 SMITHSONIAN DEPOSIT.

BIG SHIPS HOVE DOWN.

Interesting and Unusual Method of Repairs Revived.

On our front page we illustrate a process which was common 50 years ago, but which is seldom seen in these days. Before the days of dry docks repairs to a ship's hull and keel were made by securely anchoring the vessel fore and aft and pulling it over on one side with windlass, blocks, and tackle carried up to the masts at the cross-trees. When the tide went out the hull rested on the bottom on one side and the workmen had several hours in which to calk, copper or make other necessary repairs. Experience and great care were necessary when a ship was hove down or she might be a wreck.

In these days of numerous dry docks the sight of a large ship hove down is extremely rare Marine Engineering, a standard marine authority, however, recently secured a photograph which we illustrate by its courtesy. The ship is the Yarkland, a British iron hull ship which had been ashore in the Gulf of Mexico. She was towed to Pensacola, Fla., for repairs. All the openings in the hull were closed, lines of hose were run into the hull and connected to steam pumps on shore, in case she should fill with water, and steam windlasses drew the great ship over until the keel was exposed.

BIG ELECTRIC PLANT FOR CHICAGO.

Will Cost $6,000,000 and Produce 100,000 Horse Power.

One of the largest electric plants in the world will be built in Chicago by the company which now does the commercial lighting. The plant will cost $6,000,000, cover 14 acres, and have a capacity of 100,000 horse power. While five years will be spent in finishing the plant, it is expected 16,000 horse power will be in use in two years. Power will be furnished to run elevators, motors and elevated roads, in addition to lighting work.

USE PEAT FOR LOCOMOTIVE IN SWEDEN.

A locomotive built especially for the use of peat has been put in service on the state railroads of Sweden, where coal is extremely scarce and expensive. It was constructed by the Motala Werkstad, of Motala. The experiments with peat as fuel for locomotives have progressed in Sweden for some time past. Some inventors exposed the peat to strong heat in closed retorts thus producing a sort of charcoal, which was used either in the form of lumps or of powder. In the latter case special furnaces were required. One factory has two ovens, or furnaces, in the first of which the peat was converted into gases, which were burned in the second furnace under the boiler. Robert S. S. Bergh, United States consul at Gothenberg, Sweden, says:

The present tendency here is to use common peat rendered compact and transportable by being compressed by machinery. It is reported that a couple of iron works use peat with good results in the blast furnaces instead of wood or charcoal. It is alleged, however, that the use of peat does not offer any economical advantage; it has been ascertained that 1 pound of peat will produce only 4 pounds of steam, while good English coal will produce from 6 to 7 pounds. Peat costs from $2.68 to $2.95 per ton and English locomotive coal from $3.61 to $4.70 per ton. There is a movement, however, to make peat cheaper by reducing the railroad freight rates for this fuel, and improved methods of manufacture may also lessen the price.

40 Things for July 4th
How to Do Them
See POPULAR MECHANICS
for June 28

SUMMER COURSE IN MECHANICS FOR BOYS.

The publisher of Popular Mechanics announces a Summer Course in mechanics, for Boys. This will include an illustrated series of articles on How to Make Things in Wood and Iron, "written so you can understand it," and illustrated so you can do it. Selection has been made of such articles as are not too difficult, and which can be built at least possible expense for materials and tools. This course will begin with the issue of June 21st, and be continued each week until September. The opening chapters are as follows:

I. Selecting Tools and Making Work Bench.
II. Making a Small Box for Toilet Articles.
III. and IV. Building a Row Boat: This boat will be 14 ft. long and seat four persons.
V. Building a Book Case.
VI. Building a Pigeon House.
VII. Making a Cozy Corner.
VIII. Making Box to Contain Shoes, etc.
IX. Making Stand on which to Polish Shoes.
Etc. etc.

EASY ELECTRICAL EXPERIMENTS: This series which has been so popular will be continued by the same author and many extremely useful and interesting pieces of apparatus described.

THE SUCCESSFUL ONES ARE THINKERS.

One day a laborer in a great refrigerator factory discovered that a stringer in a platform leading from the office to the factory had decayed, says the Furniture Journal. The platform was an elevated one and the stringer, covered as it was by planking, might have some time given way beneath the weight of an unsuspecting person and caused him serious injury. The laborer saw this at a glance and he reported the defective stringer to the office. When the general manager heard of it he said to the time keeper,

"You may allow Nelson a half's-day's extra pay. It was a little thing to do but we want men like him who think while they work. A less careful man might never have thought of this stringer again until an accident had occurred."

The occurrence set the general manager to thinking and a little later when the men came into the factory to go to work they found a notice posted on the wall. It would be a good thing for every manufacturing company to put where its employes can read it. The notice read,

Think while you work.
We want valuable suggestions from our employes.
We ask that all suggestions be submitted in writing and dropped in the suggestion box on the first floor.
If you make a suggestion that is valuable and we adopt it we will pay you a reasonable price for it.
We want suggestions that will improve the quality of our refrigerators.
We want suggestions that will protect the operators of machinery.
We want suggestions that will improve the quality of our machine work and thus save a large expense in the cabinet department.
We want suggestions that will improve the sanitary conditions of the factory and premises.
We want suggestions that will improve our protection against fire and reduce our insurance risk to a minimum.
We want suggestions that will help us to reduce the cost of our goods and to meet competition, so that we can operate this factory full capacity eleven months in the year.
We want suggestions that will promote harmony and good feeling among our employes and fill them with an ambition to get to the front.

The Bookwalter process will be used in the manufacture of soft steel and steel castings in a big steel plant which it is proposed to build at Springfield, O.

Shipping Interests of the World's Finest Harbor

The greater commercial activity now pervading the Southern States is nowhere more manifest that in New Orleans, the Crescent City. In the accompanying illustrations we show a levee scene in New Orleans which is said to possess the finest natural harbor in the world. All day long may be seen the loading and unloading of cargoes from all the principal ports of the world. Here is the world's greatest fruit center, the largest cotton market, the greatest sugar market, the greatest rice market, the greatest exporting center in America, the largest coastwise business in the United States and the most important wheat exporting center on earth. With all there is no levee like the New Orleans levee and the person who has not seen it has missed one of the wonderful sights of the world.

Levee Scene in New Orleans.

THE VALUE OF UP-TO-DATE TOOLS.

Many an owner or superintendent of shop machinery may take lessons from the farmers. Careless as the latter proverbially is in his care costly apparatus, still he recognizes the value of labor saving machinery and every year millions of dollars are spent for self-binders, rakes, planters and the like.

In a paper read before the Western Railway Club by M. K. Barnum, master mechanic of the Union Pacific railroad, and reported in the Railway Review, attention is drawn to this subject. He says: "The amount of money that is wasted every day by the lack of 'up-to-date' tools is appreciated by very few railroad officials. If an old machine can be replaced with a new one which will do enough more work or do the same work with enough less labor to represent a saving in labor equal to 5 per cent per annum on the investment it should be entitled to careful consideration." He then recites in detail several examples. A new horizontal boring machine cost $1696 and saved $900 in 18 months; interest on investment, 53 per cent. A car wheel borer cost $1710 and saved $735, or 42½ per cent a year. A car-axle lathe that cost $1665 saved $250, or about 15 per cent. Modern engine lathes turn out 20 to 30 per cent more work than those built 20 years ago; planers, 25 to 50 per cent more; turret lathes, 50 to 60 per cent. To remove six driving wheels weighing in all 132,000 pounds took eight men four hours; four men with pneumatic jacks now do it in one hour at a cost of 66 cents. A pneumatic ram for breaking staybolts in wornout fire boxes saved in one shop 541 per cent per annum on its cost. The new pattern and core-box machines in the wood working shop will pay 100 per cent on their cost if only used one hour a day.

A road whose shop is equipped with old-time machinery and which cannot afford to put in modern apparatus would save money to let its repairs out on contract to some shop with modern equipment.

A FORTUNE IN PLANTING TREES.

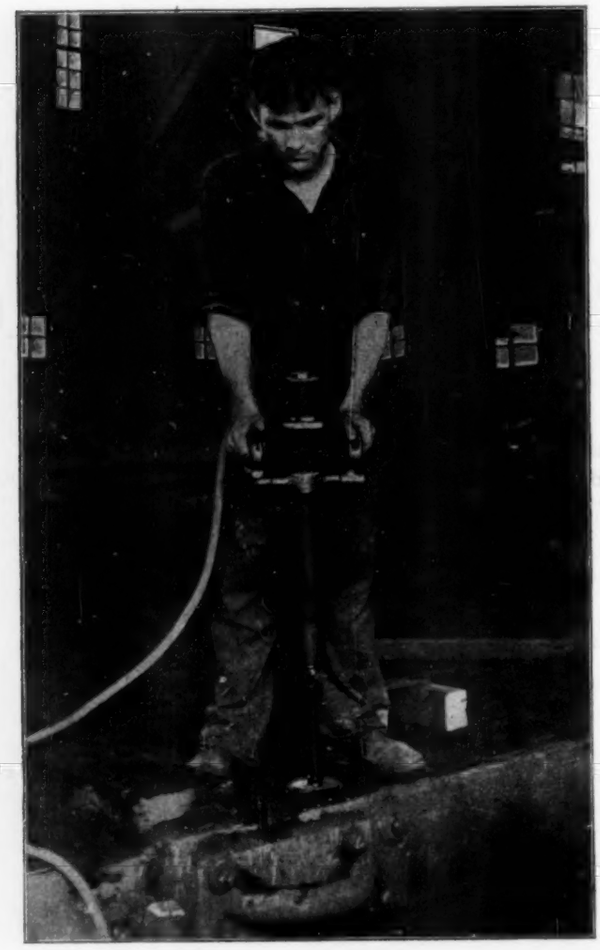
Fifteen years ago one of the "fruit kings" of Michigan said to the writer, "Young man, I will tell you how to make a fortune, though I do not expect you will do it." The explanation was given and, as he predicted, not acted on. The plan was easy; simply buy 100 acres of worthless land and plant it with black walnut trees. In 20 years these trees would have been worth a great deal of money.

Near the city of Danville, Ill., is a walnut grove that is one of the most valuable in the country. Recently $150 was refused for a single tree. Any young man who will secure even a few acres of otherwise worthless land and start a grove will have several thousand dollars' worth of valuable timber in 20 years. After the first few years the grove will not require any attention.

USING AIR TO CUT STEEL.

The Pneumatic System Has Worked Wonders in American Shops.

The toy rubber balloon which children inflate by blowing full of air which, when escaping sounds a whistle, is a somewhat crude illustration of the use of compressed air in the operation of shop tools. For 20 years compressed air has been pumped through miles of pipes in the city of Paris and used to run small motors, fans, and for similar purposes. For transmission to any considerable distance, electricity is now preferred. In this country remarkable progress has been made during the past few years, in driving tools by air. So perfect have these little

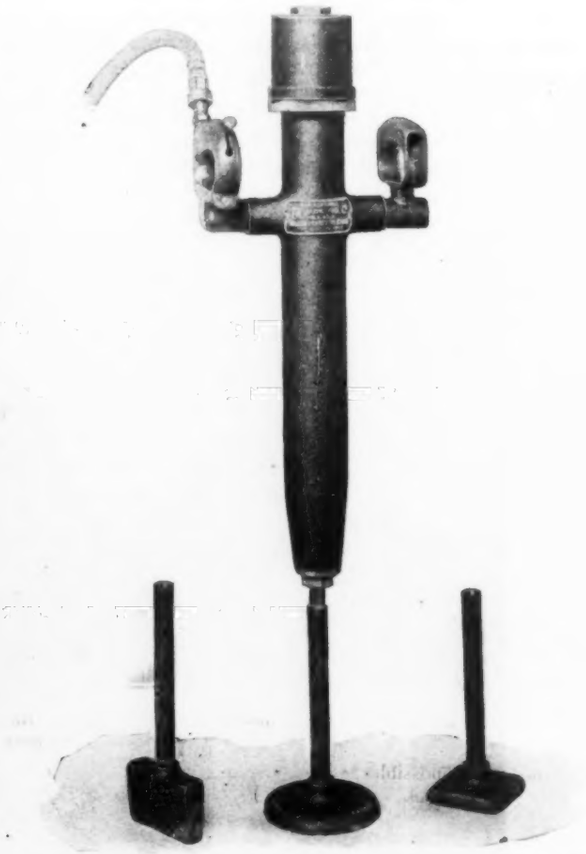


Method of Using Foundry Rammer.

machines become that many of them, capable of doing the work of 10 or even 20 men, can be carried in one hand. This perfection of labor saving machinery has contributed very largely in making America the Master Workman Nation.

The process is extremely simple: A steam engine operates a pump constantly which compresses air in a steel tank to whatever pressure is desired. This pressure ranges from 40 to 100 pounds. The air is conducted from the tank through iron pipes to all parts of the works. At frequent intervals taps are placed, to which one end of a stout hose is attached. At the outer end of the hose is the tool, which contains a miniature engine to run the drill, or drive the hammer, or whatever the tool may be. When ready, air is turned into the hose just as one turns water into a garden hose. Another valve in the tool regulates its working.

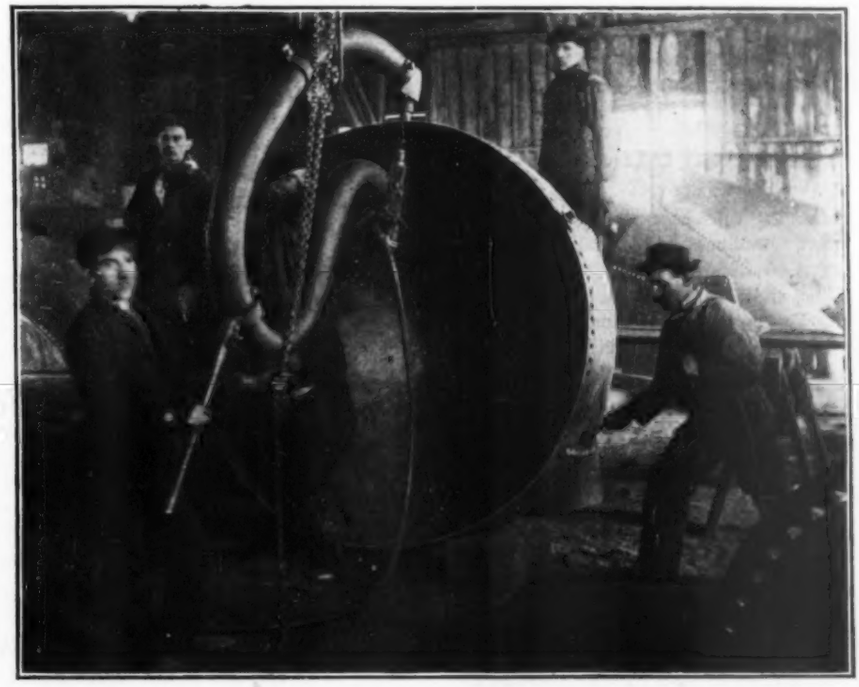
Not only does the pneumatic system make easy what was formerly extremely hard labor, but the rapidity with which the work is done is something previously thought impossible. It is



Pneumatic Rammer, Large Hand Size, for General Foundry Work.

Calking a Boiler.

the prompt adoption of such tools as this which enable American manufacturers to produce machinery and other things in a space of time impossible in the old countries with their slow acting facilities. The more common uses of the pneumatic tools are for hammering, chipping, riveting, calking, drilling and ramming. The rapidity with which some of them work is marvelous; for instance, one tool for boring wood weighs only 12½ pounds and turns the bit 1,000 times a minute. Imagine a carpenter trying to turn a brace at any such speed; and when one comes to drill holes in iron the contrast is even greater. For all kinds of iron work the pneumatic tool is indispensable. It drives rivets in boilers and iron bridges, it rams the earth in making molds for casting in foundries; it tamps the earth for foundations; it cuts iron plates as though they were wood. All these and many other operations are performed by means of air which before compression would not even cause a candle-flame to waver. The tools are numerous, their uses as varied. We illustrate a few working scenes for which we are indebted to the Philadelphia Pneumatic Tool Co.



Making Buoys for U. S. Government.—Illustration of How the Keller Yoke Riveter May Be Adapted to Work that Otherwise Would Be Extremely Difficult to Accomplish.

ELECTRIC RAILWAY ON ICE.

An electric railway was built on the ice across the River Neva at St. Petersburg, Russia, last winter and cars crossed in safety for several months. There are few bridges at this point, says the Tramway World of London, and the ice railway did a big business. The river is nearly a mile wide at this point. The trolley poles were set by chopping holes 18 inches deep in the thick ice, and pouring in water around the frames. When the water froze the poles were as firm as if set in the earth.

ONE OFFICE HANDLES 161 TONS OF MAIL IN A DAY.

Combining all grades of mail sent out from the Chicago postoffice last year, it averaged 12 pieces to the pound. The postoffice handled nearly 600,000,000 pieces, which weighed about 50,000,000 pounds. The average increase in business of the 48 sub-offices in the city amounted to 20 per cent. Money order transactions amounted to $84,506,000. The biggest day's work ever done in the Chicago postoffice was on last St. Valentine's Day, when in the central office alone the stamps on 1,511,000 letters were canceled, and 87 tons of second-class and 74 tons of third and fourth class matter were handled, all being cleaned up before the next day.

RAILROADS ASSURE AMERICA S UNITY.

A report of the dinner at Philadelphia in commemoration of the twenty-thousandth locomotive and seventieth year of continuous operation of the Baldwin Locomotive Works, has been issued in pamphlet form, neatly bound and printed on fine paper. A copy has been given as a souvenir to each of the 250 guests who were in attendance. The little volume contains a verbatim report of response to toasts with the names of all in attendance. An unique utterance in the course of the speaking was made by Assistant United States Attorney-General James M. Beck who said:

"As the shuttle swiftly passes to and fro through the texture of the loom, similarly these vehicles of commerce ceaselessly pass through the great texture of our country, weaving the sublime and harmonious pattern of its greatness. The centripetal influence of the railroad has wholly overcome the centrifugal tendencies that existed in our country prior to the great civil war. The unity of the republic was assured when the last spike was driven in the Pacific railroad."

ENGLISH LOVE THE WEED.

At the beginning of the twentieth century the British people are smoking more than twice as much tobacco as fifty years ago. There has been a great addition to the population in the interval, but in spite of this growth and the presence of thousands more of superfluous women—in a matrimonial sense—the consumption per head has practically doubled. In other words, if every woman, old and young, if every child, even infants in arms, and if every member of the Anti-Tobacco Society indulged in the solacing weed, calculations would show that the amount consumed per head was now two pounds and a quarter of an ounce, whereas, fifty years since it worked out at only one pound and a quarter of an ounce.

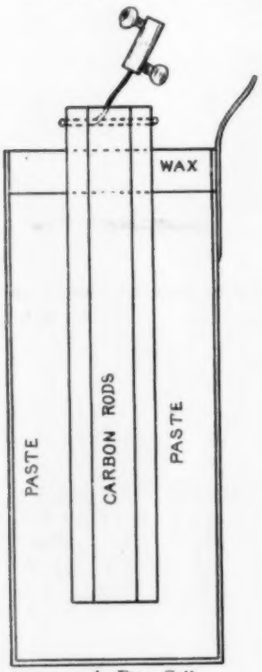
Easy Electrical Experiments
FOR BOYS

By L. P. Dickinson

CHAPTER XXIII.

HOW TO MAKE A DRY CELL.

Of late years the so-called dry cells have come into common use, chiefly because of their cleanliness and portability. Ordinary liquid cells for ringing electric bells and for similar purposes employ a stick of zinc, and a carbon plate, immersed in a solution of sal-ammoniac. Dry cells use the same material for the two poles of the cell, but instead of a liquid, use a paste formed by the mixing of sal-ammoniac and other salts, with water. They are not then perfectly dry, in the sense that they contain no moisture, but only deserve the name because the paste is thick and cannot spill as a liquid would do.



A Dry Cell.

To make such a cell there will be required first of all, a strip of sheet zinc 8½ inches long and 6 inches wide. Roll this up into a cylinder 6 inches high and 2½ inches in diameter. The zinc will overlap on the side about ⅝ inch, and should be tightly soldered. Also solder a circular piece on to one end of the cylinder, so as to completely close that end, and form a water-tight vessel. This piece should have its edges flanged, and an attempt should be made in soldering to prevent the lead used in the solder from running inside the cylinder so as to make contact with the contents of the cylinder. For this reason, the joints should be painted on the inside with good asphaltum paint. Do not, however, put the paint anywhere except at the joints.

Procure next three carbon rods such as are used in arc lamps. Each rod should be 6 inches long and about ½ inch in diameter, and copped plated. Remove the copper plate from each by means of a file except for a space of ½ inch from one end. Bind them together, the plated ends at the same end, by means of strings. Solder to the copper plate at the ends of carbon rods a wire, which pass around the three rods, making contact with each rod through the medium of the solder, and the ends of which projects 2 inches above the rods.

Immerse this end of the rods in a smoking hot dish of melted wax (either paraffine or beeswax), until the pores of the carbon for a space of one inch from the ends of the rods are thoroughly saturated with the wax.

To make the paste take ¼ lb. zinc oxide, ¼ lb. sal-ammoniac, ¾ lb. plaster, ¼ lb. chloride of zinc and mix them into a paste by adding ½ pint of water. The first three ingredients at least can probably be secured even by those who have not access to the larger stores. In case of necessity the chloride of zinc may be omitted, and its place supplied by using a little more of the other solid ingredients.

Insert enough paste into the bottom of the zinc cylinder to form a layer ½ inch thick. Rest the end of the carbon rods upon this, with the plated ends projecting from the top, and holding the rods in the center of the cylinder, push the paste into the space between the rods and the cylinder, using a stick for the purpose. Fill the space evenly all around the carbon rods, until the paste is within ¾ inch of the top of the dish.

Pour over the top of the paste a wax made by melting together ½ lb. rosin and 2 oz. of beeswax. This seals the cell, preventing the contents from evaporating and spilling. Connection is made with the zinc by a wire soldered to the outside of the zinc cylinder at the top. Connection is made with the carbon rods by means of the wire soldered to them. In both cases, screw connectors similar to that shown in the figure are very desirable.

Such a cell is very useful when currents are wanted for a very short time, as for example, in the case of the electric bells. This form of cell is, however, wholly unfitted for those purposes when a current is desired for a considerable time, like telegraph work. The cell described gives an electromotive force of 1.3 volts and will easily ring an electric bell through 50 ft. of wire.

If carbon rods which are plated with copper cannot be secured, they may be plated as described in the issue of May 24 of this paper. Or connection may be made by twisting wires firmly about the upper ends of the rods.

It will improve the working of the cell very much if the carbon rods are surrounded by a layer of black oxide of manganese. If this can be secured it should be used, although those who do not have access to the large cities, may find some difficulty in securing it.

MORSE TELEGRAPH ALPHABET.

Owing to an accident at the engravers, which was not discovered until the paper was printed, one of the letters in the Morse alphabet last week was incorrect. Two dots (were run together and made a dash (—). The correct alphabet reads as follows:

A · —	K — · —	U · · —
B — · · ·	L — — —	V · · · —
C — · — ·	M — —	W · — —
D — · ·	N — ·	X — · · —
E ·	O — — —	Y — · — —
F · · — ·	P · — — ·	Z — — · ·
G — — ·	Q — — · —	& · — · · ·
H · · · ·	R · — ·	. · — · — · —
I · ·	S · · ·	, — — · · —
J · — — —	T —	? · · — — · ·

ANSWERS TO CORRESPONDENTS.

Question:—I would like to ask if the motor just described could be run as a dynamo, and what changes would be necessary. Would the water motor described in No. 1 run it, and what would be its voltage and amperage?

Answer:—The motor may be run as a dynamo without any change, provided the field magnets be once excited by means of a battery. It may be necessary to reverse the connection of the field coils, but this can be determined by experiment.

The water motor will be of sufficient power to run the dynamo. The voltage will depend upon the speed, and this will depend upon the water pressure. It will probably be about five volts. The maximum current which the machine will deliver is about five amperes.

Question:—A toy dynamo with permanent magnet gives a current that one can hardly bear, yet it will not affect a bell or a 1 C. P. light. Can you explain why?

Answer:—The dynamo is wound to give a high voltage, but the amount of current that it will deliver is very small. The current necessary to give a shock is quite small, but a high voltage is necessary in order to send even this small current through

the high resistance of the human body. The current required by an electric bell or a 1 C. P. light is about one ampere, and the small dynamo cannot give this, although its voltage is high, because of the high resistance of its own windings.

QUESTION:—Will you please tell me how to get spots off of polished steel such as a razor.

ANSWER:—Rub the spot with a rag dipped in kerosene. Then rub dry, and polish with a piece of the finest crocus paper or cloth. The original polish cannot be restored by hand, but can be restored by polishing upon a buffer such as is used by nickel platers.

QUESTION:—I would like to ask if it would interfere with the working of the motor described in a previous issue. to paint the wires of the armature and field.

ANSWER:—It will improve the motor to give the wire two coats of brown shellac such as may be bought at any paint shop. After the shellac is dry, the wires may be painted any desired color, using ordinary paint.

Question:—Please decide in next number of Popular Mechanics.

Does a 50 arc light dynamo require 12 all-night lamps to prevent burning out? Will a 50-horse power dynamo burn out if more power is used? In short, does an arc light dynamo burn out if not enough is used and a 50 horse power dynamo burn out if more power is used? This is to settle a controversy with self and a city official.

Question:—Would like you to give me your decision to be published in local papers. City owns an electric light plant. Has a merchant dynamo 50-arc light capacity. Some merchants use light to 10 p. m., others to 12, and some all night lamps. To keep from burning out the dynamo the city has six lamps burning on streets free.

One consumer uses power from the city plant. He burnt out his motor because he used more power than the machine could carry. The manufacturer of the motor informed him to be secure he should use a 2-horse power for 1-horse power work, or in other words have double capacity to insure safety. Please note electric supply company claims a shortage of power burns out the machine. Our city council says a surplus of power is what burns out his machine.

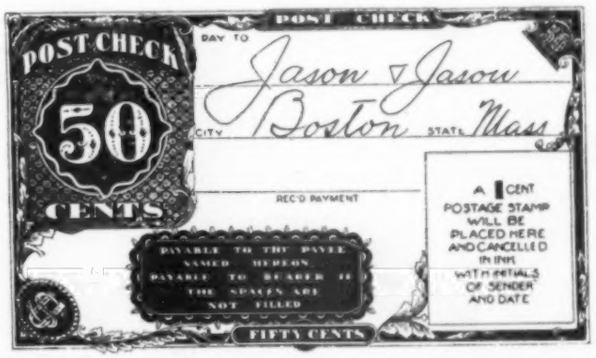
Answer:—[The two questions are from the same city regarding the same plant.] It is evident that the 50-light arc dynamo referred to is of the series type and is constructed to operate at a constant speed. Therefore at a constant speed with the full armature current going through the fields it naturally energizes the fields for full load or for its full potential. Now if a number of lamps are cut out of circuit while the machine is not producing its full horse-power as in the first class referred to, the voltage runs higher per lamp with a few lamps than with full load. Therefore the field winding gets more than its normal voltage under such conditions which causes them to run hot and burn out. This can be overcome if the operator of the dynamo puts an extra resistance in the field circuit to reduce the current in the fields when the number of lamps desired are reduced. He is evidently operating his dynamo improperly. With this extra field resistance his 50-light dynamos should carry ten or twelve lamps very satisfactorily.

Both conditions you cite are correct, but the two types of machines referred to are entirely different. The merchant who was advised to use a two horse power motor or dynamo instead of a one horse-power evidently had more work than the one horse-power would deliver and naturally required a larger machine. This type of machine, however, is an entirely different form of electric dynamo from the arc machine above referred to. The field winding of the latter is of the shunt or constant current type and its heating would be practically in proportion to the work it was performing. In the case of the arc machine it was not because the machine was overloaded from a power standpoint, but simply because an undue amount of current was flowing through the field windings. The actual amount of power required to drive this dynamo was of course much less with a few lamps burning than when the full number was in use.

THE PROPOSED NEW POST CHECK.

A new form of money order, the Post Check, which promises to do away with the many inconveniences of our present money order system, is proposed by a congressional measure.

The checks are to facilitate the sending of small amounts



through the mails. They are the acme of simplicity and may be made to pass as currency, transferred from one person to another without endorsement. The Chicago Dry Goods reporter says:

"The idea is that a man who wants to send money through the mail can buy these checks at any postoffice. When he gets

ready to send his money all he has to do is fill in the name of the party to whom the money may be due, endorse it on the back, put on a postal stamp, cancel same and enclose the check in his letter. When the check arrives at its destination the addresse may cash it anywhere or re-indorse it to somebody else, the same way as an ordinary check payable to bearer.

The Great Northern Steamship Company, James J. Hill, president, will build three more monster ships for the Oriental trade between Seattle and China.

A bill has been passed by the House of Representatives stopping the coinage of silver dollars indefinitely and providing that the bulion be coined into small change.

The John A. Roebling's Sons Company of Trenton, N. J., will build extensive branch works near St. Louis.

Popular Mechanics

H. H. WINDSOR, Publisher

Journal Building, - - - Chicago

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A GRASSHOPPER CATCHER.

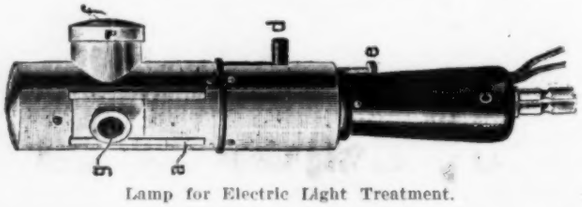
In some of the western states grasshoppers have appeared in unusual numbers. Many of the farmers are using a "hopper doser" to get rid of the pest. The machine is mounted on

Machine to Catch Grasshoppers.

wooden runners and drawn by horses. The grasshoppers are caught by the wide strip of cloth at the back of the device and fall into iron pans filed with a mixture of water and kerosene.

LAMP FOR ELECTRIC LIGHT CURE.

There has been brought out in England a lamp for giving electric light treatment. The lamp may be carried about and connected to any electric light fixture in the sick room. The

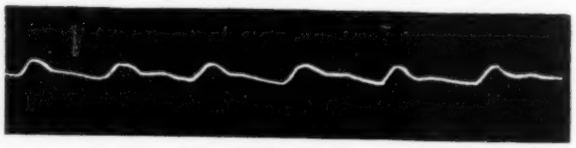


Lamp for Electric Light Treatment.

light shines through a convex rock-crystal lens at f and is turned on by pressing the button d; the strength of the light is changed by turning the handle c. At g is a blue glass window for observing the arc. In use the lamp is pressed directly on the flesh to be treated. Small lamps are made to insert in the mouth for that treatment.

DIAGRAM OF HEART ACTION.

In an article on diseases of the heart in the Journal of the American Medical Association the writer illustrates the heart action as indicated by the pulse. The records are made with



Normal pulse.

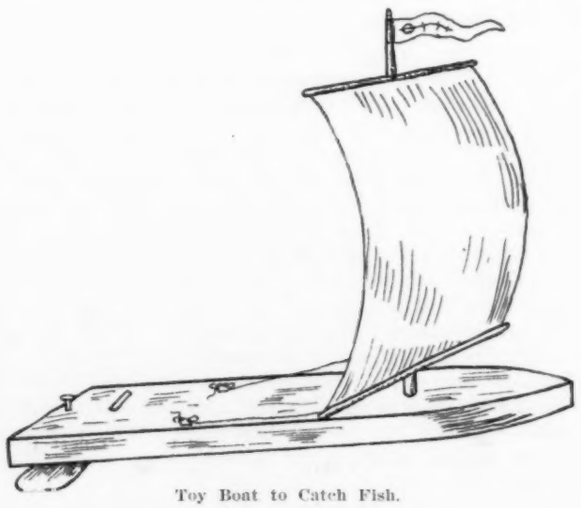
Normal pulse, case of brain exhaustion.

Neurasthenia cordis.

a very delicate instrument which traces the motion of the pulse, making record with a pencil on a strip of paper. From these records the expert can determine the nature and extent of the disease. We show a few of these tracings which give a general idea of what the readings are.

FISHING WITH A TOY BOAT IS RARE SPORT.

Toy boats may be made a means of rare sport, not only to boys but to grown up men, when fishing lines with baited hooks are attached to them. Trolling with the aid of one of these



Toy Boat to Catch Fish.

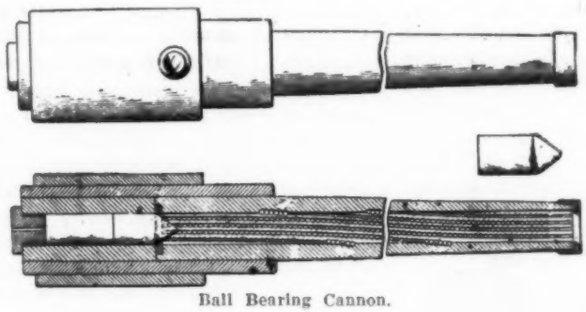
diminutive sailing vessels never fails to bring in a good string of fish. Sailing before the wind and carrying one or more fishing lines attached, the bait is trolled in a manner that is irresistible to pickerel, bass, perch and nearly every other inhabitant of the water. It does not make a great noise and scare the fish away

as in the case of a large boat. The boat may be made of a piece of board of nearly any size, just so that it be wide that it may not be easily tipped over. Make the rudder very long in proportion to the size of the boat so that it will not make lee way and will keep on a straight course. Rig it out with one or two masts and sails of cloth. Tie fish lines with baited hooks to nails in the stern of the boat. If you are not equipped with a row boat to go after the little sailing vessel when it begins to heave and toss in the water, indicating a fish on the hook, you may have a line attached to the sailing boat by which it and the fish may be hauled to shore. In the latter case the boat will probably upset and you ought to have additional sails to rig it up afresh.

WONDERFUL POWER OF THE BALL BEARING GUN.

New Invention Defeats Two Standard Makes in a Contest, and Has Many Advantages.

A gun that threatens to revolutionize the manufacture of army ordnance has been invented by Capt. Orlan Clyde Cullen, 700 7th street, N. W., Washington, D. C. It is known as the "Cullen Ball Bearing Rifle Gun." The idea occurred to Capt. Cullen in the hospital in Cuba, while he lay suffering from three serious saber wounds inflicted by soldiers of the Spanish regiment of the Infanta Isabella. The captain had witnessed the jamming of two Hotchkiss guns from overheating in action. How to build a gun that would not kick or heat up was a question that he tried to answer between the times when he was delirious with fever. The solution of the problem came to him in the idea of the



Ball Bearing Cannon.

ball-bearing rifle. He immediately arose from his bed and drew out the plans on paper.

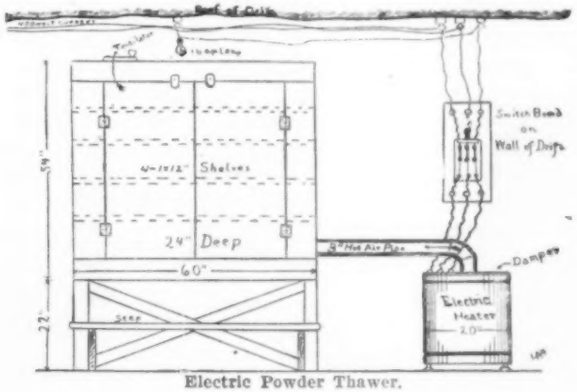
The captain recovered from his illness, a company with $500,000 capital was formed, and the manufacture of the "Cullen Ball Bearing Rifle" begun. How well Capt. Cullen has succeeded may be judged from the report of a recent competitive test with Maxim and Driggs and Hotchkiss guns. The report states:

All four guns were fired at a plate of nickel steel 20 feet square and 1⅜ inches thick. The plate was 3,000 yards from guns. The ball-bearing gun was fired and the projectile struck and penetrated plate (3 feet from center of target), ricochetted, and was picked up 1,620 yards beyond, embedded in the dirt 17 inches, making a total range of 4,626 yards, after getting through 1⅜ inches of best armour plate. The three other guns before mentioned were fired, hit the plate in two instances (the Driggs and Hotchkiss, with their projectiles, failed to penetrate the plate, and glanced into the earth in front of it.) The Maxim projectile hit the plate and stuck in it with the nose of the projectile, extending ⅝ of an inch through it.

An automobile in which M. Rosenbaum and two actresses were riding caught fire at 23rd street and 6th avenue, New York, from the gasoline tanks and burned up.

ELECTRIC POWDER THAWER.

In an Idaho mine lighted with electricity the chief engineer has devised an arrangement for safely thawing his powder, which on account of the extreme cold in winter, frequently freezes. The Mining and Scientific Press describes it as a magazine 5 feet long 4½ feet high and 2 feet deep, set on a stand



Electric Powder Thawer.

22 inches above the floor of the mine. The powder is placed in galvanized iron trays which are placed on the shelves. The trays are partly filled with sand. A ventilation at the tops allows gases to escape, and two thermometers indicate the temperature which should be from 70 to 75 degrees F. Air is heated in a "stove" which is a galvanized iron drum containing 30 coils of No. 22 tinned steel wire—German silver wire is better, but more expensive. The drum is open at the bottom and stands on porcelain knobs to secure insulation. A voltage of 400 is used. Three hours are required to thaw the powder. The temperature must not rise above 80 degrees.

HIGH VOLTAGE DISTRIBUTION FUSE BOX.

This device is a recent English invention. The fuses are increased in a box and are visible through a glass window. The

High Voltage Fuse Box.

design of the bridge gives a 3½ length of fuse. Milled nuts hold the fuse wire in place. All the insulation is English china.

POTATO GROWING A MECHANICAL SCIENCE.

Everything From Planting to Eating Done by Machinery.

Potato growing has been reduced to a science, so advanced that the old methods seem ridiculously antiquated. Potato cutters, planters, fertilizers, sprayers, diggers, sorters, and other devices make the

Fig. 1
Bed of Knives.

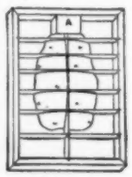


Fig. 2
Potato Cutter.

growing purely a mechanical process from before the time the potato is planted until it is placed on the cars for shipment. The result is a wonderful saving in labor and expense and the rapidity of work places America ahead of all other nations as a producer of the "Solanum tuberosum," which Webster says "has

Fig. 3—Potato Planter.

proved one of the greatest blessings bestowed on man by the Creator."

There is now manufactured every conceivable kind of machinery for the growing and marketing of potatoes. We illustrate some of the machines made at the factory of the Aspinwall Company. In raising potatoes the very first thing to do is to cut up seed potatoes containing the eyes. This work is the office of the potato cutter (Figs.

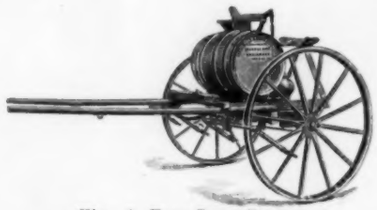


Fig. 4—Four-Row Sprayer.

1 and 2). With this the cutting is as rapid as the planting and the cutter can easily keep pace with the planter, into the hopper of which the potatoes are placed after being cut.

The planter (Fig. 3) is automatic and requires but a team and driver to operate it. It marks the row, opens the furrow, drops and covers the seed, shallow or deep as desired, all in one operation. It will plant from five to nine acres a day with one man and a team. This machine alone will do the work of 10 men. When desired it is provided with an attachment which places the fertilizer underneath the seed after the most approved method.

After the potato is planted the next work is the spraying of bug poison to destroy the insects that infest the growing vines.

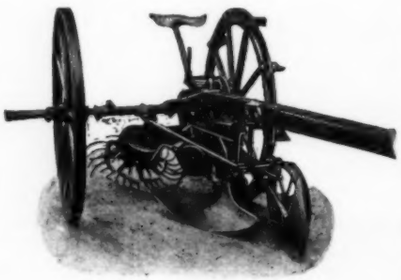


Fig. 5—Potato Digger.

In Fig. 4 we show the Aspinwall 4-row sprayer. It will spray 30 acres per day, one barrel of the mixture covering about six acres.

Then comes the digging, formerly done with a hoe, now twenty times quicker with the potato digger, Fig. 5. The pulverizing wheel automatically removes the tops and throws them to one side. Following close in its path is the plow which turns the soil and then come the concave forks, which pick up the potatoes and with their rota-

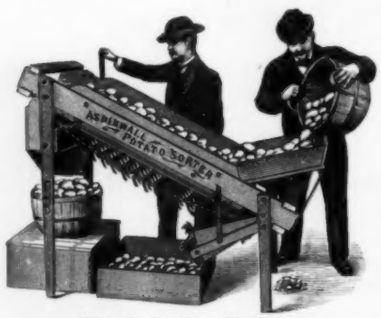


Fig. 6—Sorting Machine.

ting movement separate them from the dirt before again discharging them.

After the potatoes are dug it is necessary to assort them into different sizes for the market, to pick out the bad and ill-formed ones. This is done by the aid of the potato sorter (Fig. 6.) It separates them into three sizes, the marketable, or large potatoes; the second, sorting or seed; and the "third sorting," which falls through with the dirt. These are separated from the dirt by means of a box with a wire screen bottom.

Then the potatoes are shipped to the market, and you know the rest.

THE LATEST STREET PIANO.

Something new in street pianos has made its appearance. It is the most strenuous thing yet. Some morning if you are awakened from the last stages of a late nap by the strains of "Dolly Gray" swelling from the pavement below, with that soothing, melodious effect characteristic of the street organ, and you happen to note a nerve-shattering, ear-jarring, rolling accompaniment, sounding like thunder in a realistic melodrama, don't get frightened. Don't imagine, either, that a circus has slipped into town without plastering the billboards. This is simply the "something new" in street pianos in practical operation.

The novel addition to the street pianos consists of a drum attachment. The head of the drum is so arranged that at certain intervals it comes into contact with the automatic sticks, which move rapidly and produce almost as good a roll as could the most expert drummer. This serves as an accompaniment to the piping strains of the piano, and when worked to the fullest extent can be distinctly heard for six blocks or to the top story of the tallest skyscraper.

FROZE THE EARTH TO SINK A SHAFT.

All other methods having failed, the freezing process was successfully resorted to in sinking a shaft at the Ronnenberg alkali works near Hanover, Germany. Thirty freezing tubes were sunk to a depth of 413 feet on a circle 29.5 feet in diameter. The shaft sunk was 26.5 feet outside diameter and 18 feet inside the masonry portion. Freezing machines of the Fixary system were installed, double in capacity those that would have been used in a soil where there was no salt. The work was successfully completed in seven months after the actual freezing operation began, although it was more than two years after the sinking of the tubes began.

The soil penetrated was very irregular for a distance of 407 feet and largely composed of irregular masses of gypsum. The bed of salts of potash lay at a depth of about 459 feet. Immediately overlying the salt formation was a 50-foot layer of hard and compact gypsum. Before resorting to the freezing process an attempt was made to cut out the gypsum by a truss armed with cutting tools, and to lift out the water. But during the sinking operation both the masonry and the iron lining began to move under the pressure of the very treacherous soil, and at a depth of 105 feet the masonry had moved four inches out of line. Soil rushed into the shaft from the bottom and the water increased in quantity until it amount to 1412 cubic feet per minute, or almost the capacity of the pumps.

Washington is said to have the best street car system in the world.

SHOP NOTES

SHOWER BATH FOR ENGINEERS.

A writer in The Engineer tells how he made a shower bath for use at the station. He says: It is placed in one corner of the basement, and consists of a pipe piped to the city water as at M. A valve is placed at A. The pipe is connected with steam pipe at B. The end of the pipe is made in a circle as at E, and is capped as at R. The circle is drilled all the way around with ⅛-inch holes as shown. N is

Fig. 1. Shower Bath for Engineers.

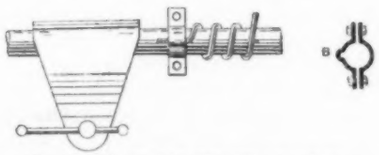


Fig. 2 and 3. Method of Bending Small Pipe.

a steam pipe with a valve at A. When ready to take a bath open both valves so as to get the water the right temperature and then all that is necessary is to step under, the water will do the rest. The bath room is 4 feet square and the dressing-room 5 feet square.

Fig. 2 shows a good way to bend small pipe. Place a pipe in the vise the size of the circle required, place the clamp on the pipe in the vise as shown in Fig. 3, and make the clamp as shown so that the end of the small pipe to be bent can be placed in the part of the clamp at B. I have found it is best to first heat the pipe, if brass, to a dull red. This can be plainly seen by holding it in a dark place; let it cool and it can then be bent easily into a circle.

HEATING AND WORKING STEEL.

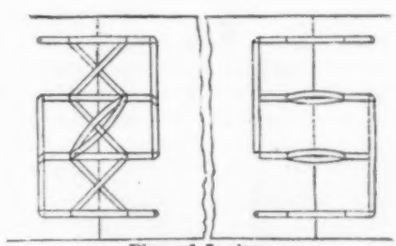
John L. Bacon, instructor in Forging, Lewis Institute, Chicago, in an article to blacksmiths, in the American Blacksmith, says:

In heating steel, as in everything else, science and common sense should be exercised. It is very discouraging to the steel maker who looks on his philosophy as being correct, to find that after all his care and expense, his product is abused in heating after it leaves the mill. Unequal heating will produce an inequality of the particles, and will cause their displacement in one direction or another when the steel is subjected to the forging process. Thus the different or varying state of heat appears to be of greater moment than is usually taken into consideration. In working a piece of steel with uneven heat, the particles are pushed out of their normal position and no amount of annealing can altogether replace them. The particles of steel will arange themselves in obedience to natural laws.

Forging steel at a black heat will crush the particles or bring about rapid crystallization. Some say that the word "crystallization" is not applicable, so I will say, "enlarge the crystals." Steel should be in a plastic state during the process of forging, and the heat should be as even as it is possible to have it; the force of the blow should also penetrate the whole mass so as to prevent the drawing of the exterior surface away from the core or center. When the outside of the steel is worked more than the inside, the effect is telescopic, and the steel can only be rehabilitated by annealing, and then by no means will the temper be uniform. Hence, do not work steel at too low a heat, lest you strain it. Do not work it at an uneven or irregular heat, or the particles will be as variegated as the frost lines on a window glass. Too high heating will make the steel brittle and destroy its cohesive properties. The secret of successful tool-smithing is proper heating, and I will say that proper heating commences from the molten state at the mill.

LACING LARGE BELTS.

Some time ago a correspondent of the Engineer gave that paper the accompanying plan of lacing large belts. He had



Plan of Lacing.

tried it on large heavy belts and found it so effective that it never pulled out or apart. The belts were relaced once a year.

L. A. Strange, the Cuban balloonist who fell from the sky into the sea, while making an ascension at New Haven, Conn., recently, says that he should have drowned had he not been picked up by a passing boat soon after he struck the water. He is now none the worse for his experience.

A NEW SUBSTITUTE FOR RUBBER.

A new substitute for rubber has been patented by Vienna inventors which is said to be more elastic and durable than any other that has yet been placed on the market. Leather is reduced by machinery to fibre and soaked under agitation for a considerable time in tanner's dressing (bruised barley and leaven and water). The mass is dried and steeped for some time in oil freed from acid by treatment with warm water. Cork in pieces the size of hazel nuts is boiled in the thickened sap of the landolphia plant root, and allowed to dry slowly. Waste rubber in moderately sized lumps is separately boiled in from one to two per cent solution of caustic. Rubber-linseed oil is then prepared by dissolving rubber in linseed oil at a temperature of from 40 to 60 degrees C. These materials and asbestos are mixed in proportions which the inventors refuse to divulge. The mass is then placed in calendars provided with heated adustable rollers and finally treated with chemicals for the purpose of vulcanizing.

FREEZING OF MOISTURE DEPOSITED FROM COMPRESSED AIR.

At the Drummond Colliery, Nova Scotia, for running an underground pump by compressed air two receivers are used, one near the pump, and another 300 feet farther back on the pipe line, writes Prof. Robert Peele in April Mines and Minerals. The air pressure in the main from the surface is 85 pounds, and as the proportions of the cylinders of this particular pump are such that so high a pressure is unnecessary, a reducing valve was put in the pipe just before reaching the first receiver. By this valve the air is wire drawn to reduce the pressure to 45 pounds, which results in a deposition of nearly one-half the entrained water, in addition to that already deposited in the pipe. It is found that more moisture collects in the first than in the second receiver (as might be expected), and by this device the serious difficulty encountered from freezing at the pump has been entirely overcome. The temperature lost by the reduction of pressure to 45 pounds is regained before the air reaches the pump. At the Anaconda mines, where there is a long line of piping laid on the surface, there was formerly frequent choking of the pipes from freezing. By passing the air through a series of old boilers put in close to the compression house the trouble was corrected.

Harry Hicks, who was killed a few days ago at Kingston Point, N. Y., from falling 800 feet from a parachute, was a nephew of Charles Kabrick, a well known balloonist.

DISCHARGING WATER INTO TANKS.

It will require less power to force water into the bottom of a tank in nearly all cases and at least the same power will be required to force it over the top as into the bottom, in all cases, says The Engineer.

This may be understood by referring to

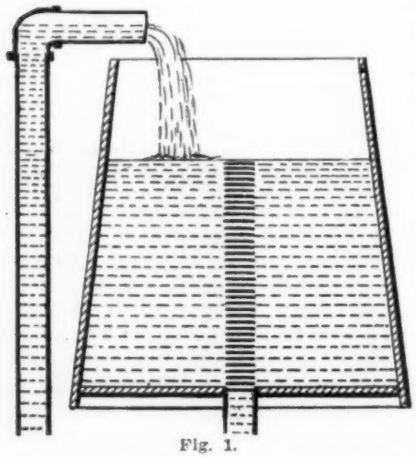


Fig. 1.

the accompanying drawing, Fig. 1. It will be seen that, measured from the bottom of the tank, the depth and consequently the weight of the body of water having the same area as the pipe, which is shown by the shaded portion, is less when pumping into the bottom of the tank, hence the power required will also be less. Referring to Fig. 2, it will be seen that when the construction of the tank is such that the water enters near the top but below the level in the tank, the power required will never be less than is required to force the water into the bottom of the tank. For this reason the bottom is generally selected

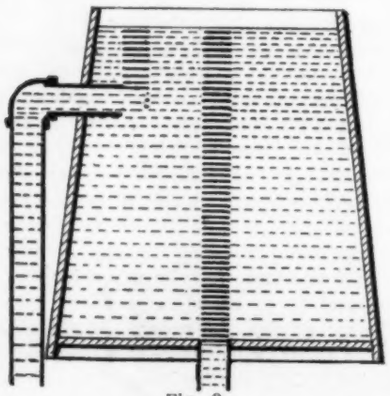


Fig. 2.

as the better place to introduce the delivery pipe, as far as the power required to introduce the water is concerned.

Leopold Batres, Mexican conservator of monuments, has discovered on Monte Alban, Mexico, the ruins of an ancient city, which shows unmistakable indications of having been submerged at least 3,000 years.

LAUDS SUBMARINE TORPEDO BOATS.

Naval Expert Says One Boat May Drive Away a Whole Fleet.

Ensign Nelson, expert in charge of the torpedo station at Fort Royal, has given remarkable testimony before the House Committee on Naval Affairs relative to the merits of submarine torpedo boats, which many have condemned because of the great danger of explosion. He declared that a submarine boat of the Holland type could drive an entire hostile fleet out of a harbor because the enemy, if wise, would put out to sea to avoid attack which could not be prevented, because it would be delivered entirely out of sight. A fleet dare not approach the harbor near enough to cover the landing of troops or to make effective use of small calibered guns against shore defenses. The moral effect of a submarine boat, he declared, was even greater than its destructive ability. He predicts that the submarine boat is destined to produce as vast a change in naval architecture as that which followed the success of Erricsson's Monitor and urges that the United States at once develop a fleet of submarine boats o fthe latest and best types.

HELPS IN SHOP AND HOME.

John W. Holler, a railroad man at East Alton, Ill., writes: "In February some sample copies of your paper were introduced in our shop and after reading it over I accepted your trial offer and am very well pleased with it. It is one of the best of its kind I have ever read and I will continue to take it. I find it to be a great help in the shop as well as in the home."

WIRELESS TELEGRAPHY BETWEEN NEW YORK AND CHICAGO.

Prof. R. A. Fessenden, whose wireless telegraph system was successfully exhibited before United State government officials at Cape Hatteras recently, says that he will endeavor to establish wireless telegraphic service between New York and Chicago. He declared that his system may be operated successfully between points on land and its practicability is soon to be demonstrated between Annapolis and Washington.

The professor is now at work on an improved instrument which, he says, will permit a sending operator to know whether or not his messages are being received at the station for which they are intended. In other words it will be possible for the receiving operator to "break" the sender as can be done over a wire. Now, the receiving operator must wait until the sender completes his message before he can communicate with the sending station. Prof. Fessenden claims that his system is inimitable, and that it can be operated with absolute safety without fear of messages being intercepted.

SEARCH FOR A PAPER MATERIAL.

Wanted—Something besides spruce and white pine wood pulp from which cheap paper can be manufactured. These sources of supply are so rapidly becoming exhausted as to threaten the existence of the one-cent daily newspaper and other large consumers.

At present, as one manufacturer said, "paper is made from nearly every old thing." Linen and cotton rags and waste flax make the best. Old grass ropes, coffee sacks, banana peels, waste wheat and oat straw, hemp fibre and in fact nearly everything that is thrown away, are used in its manufacture, but still the source is not equal to the demand. Experiments are now being made with all kinds of grasses, bamboo fibre, banana stalks, dis grass from the north coast of Africa, leaves of the dwarf palm, sugar cane bagasse, hop plant, ramie, agave, nettles, sea grass, etc., and some promise well of success.

Says the Southern Industrial Review: "A material which nature may renew yearly must be discovered and adapted to the trade and the most natural sources must be sought in the field of agriculture or among the fibres and grasses which have annual growth."

WANT BIDS FOR PNEUMATIC MAIL TUBES.

The United States Post Office Department will establish the pneumatic mail service in New York, Chicago, Philadelphia, Boston, Brooklyn, St. Louis and Washington. Bids will be advertised for and sealed proposals will be received until July 12 at 4 p. m.

SEARCHLIGHT FOR COAST DEFENSE.

Searchlights are to play a conspicuous part in American coast defenses. Extensive experiments with the lights are to soon be made by General Gillespie, chief engineer of the army. The fortifications act of last year appropriated $150,000 for the installation of the lights in New York harbor. It is now proposed to install the same system at Portland, Me., Boston, the eastern entrance of New York, and Puget Sound. It is planned to use the target and most effective searchlights, those having a range of 2,500 yards. It is proposed this year in the maneuvers at Narraganset Bay to multiply the searchlights in such way as to determine definitely whether the main channels in the four harbors named can be lighted up.

The ship subsidy bill has been killed by the Morgan Steamship trust, according to admissions made by friends of the bill.

TO VOTE "AYE" AND "NO" BY ELECTRICITY.

Electrical Voting Machine to be Installed in the House of Representatives.

Voting and answering the roll call in the House of Representatives is to be done by electricity. The electrical voting machine, which is recommended by Architect Woods, will save many hours of time and prevent the great amount of confusion that now often prevails. The machine consists of a transmitter on each member's desk which is connected electrically with a single printing receiver for printing in three columns alphabetical lists of names of members voting "aye," "no" and "present." Three totalizers are arranged so as to be readily observed by the members for giving the totals of the three classes of votes. Each transmitter comprises a small ornamental casing about four inches square with a Yale lock in its front face; also two push buttons, one marked "present" and the other "mistake;" and an opening about the lock disclosing the letters "O. K." When a member desires to vote he inserts the key into the lock and turns it to the right, if he wishes to vote in the affirmative, or to the left, if in the negative. The member then withdraws the key and the vote is ready to be counted. If he desires to change his vote before it is counted he merely presses the "mistake" button and the machine returns to its normal position, after which the correct vote may be registered. In order to vote "present" the key is inserted in the lock and turned to the right or left and the "present" button is pressed. A correction of this vote can also be made by pressing the "mistake" button.

The internal mechanism of the transmitter involves only an ordinary Yale lock with a circuit-breaking disk carried by its barrel and a release magnet for permitting the parts to return to their normal position when the vote is received. The printing receiver, which is the apparatus for collecting the votes registered at the member's desk and for printing them in three alphabetical lists ready for the Congressional Record, comprises a stencil-carrying triplicate alphabetical list of all the names of the members. If a member votes in the affirmative his name is printed from the first list; if in the negative, from the second list, and if "present" from the third list. In this way the vote will consist of three lists already for the Record. The totalizer is no more than a large "fare" register, except that the figures are thrown on a screen like a magic lantern, so as to be large enough to be seen from all parts of the House and at the same time enable the disks to be made small enough to turn at high speed.

Popular Mechanics is "written so you can understand it."

EARTH CURRENTS OF ELECTRICITY.

Are there great currents of electricity moving through the earth like underground rivers, following the same course year after year, or do these currents change like the movements of clouds which travel in many directions during the same day? E. Guarini, a noted scientist, discusses the subject in the London Electrical Review of May 16, and states the origin and nature of these earth currents are still unknown. Much has been written on the subject and the great electrical congress in Paris in 1881 devoted days to its discussion. The first investigation made by Kemp in Edinburg, in 1828, has been continued in many countries. M. de la Rive attributed them to chemical action taking place in the interior of the earth. Sabine, another, traced them to spots on the sun; some think they are caused by violent gales, and others by the stars.

Testing Earth Currents.

We illustrate a simple instrument which anyone can set up and observe. The galvonometer can be made from directions given in Popular Mechanics of Feb. 1, or may be purchased. The experiments made last fall by a scientist in Spain were as follows:

M. Perez del Pulgar used as connections to earth the extremities of two lightning conductors which protect the Observatory, and connected them to a galvanometer after having made sure (by introducing a very great resistance into the circuit of the galvanometer) that no atmospheric current was passing through the galvanometer, starting from the higher lightning conductor and ending at the earth connection of the lower one (the whole of this current went almost directly to earth owing to the great resistance of the derived circuit of the galvanometer) he commenced his observations. He found:—(1) That the oscillations of the galvanometer are more frequent and more intense when there are thick clouds being carried along at a considerable speed; (2) that the variation in intensity of the sun's light seems to cause variations in the intensity of the earth currents; (3) that on damp and foggy days the needle generally points to zero; (4) that the wind very appreciably influences the intensity of earth currents, this intensity increasing in inverse proportion to the rate at which the wind travels. Notwithstanding his observations, M. Perez del Pulgar concludes that the nature and the origin of earth currents cannot yet be explained satisfactorily.

The resistance mentioned is made by winding 25 to 100 feet of insulated wire in a coil like a spiral spring.

As these currents are found everywhere the experiment can be made wherever lightning rods are available.

William K. Vanderbilt, Jr., has bought 500 acres of land at Lakeville, Long Island, on which he is to build a one-mile private auto track.

LOCK FOR HATS.

An interesting device has been put on the market whereby guests at restaurants may lock their hats on a hook and hold the key while dining. Mistakes, accidental or otherwise, are thus prevented. The locks are made by the Safety Check Hook Co.

Device for Locking Hats.

AMERICAN STEEL FOUNDRIES COMBINE.

Official announcement of the formation of the American Steel Foundries Company is made. The six companies which will enter into the consolidation are: American Steel Castings Company of New Jersey, Reliance Steel Castings Company, limited, of Pittsburg, Leighton & Howard Steel Company of St. Louis, Franklin Steel Casting Company of Franklin, Pa., the Sargent Company of Chicago, and American Steel Foundry Company of St. Louis. This new corporation will be closely aassociated with the United States Steel Corporation.. It will also have close connections with the shipping combination.

ELECTRIC LINES IN CEMETERIES.

Electric railways may soon be run into all the cemeteries of Cleveland, O., to facilitate the operation of the electric funeral cars which are growing in popularity. The Cleveland Electric Railway Company has already obtained permission to build a tract into Lake View cemetery and will endeavor to lay tracks in all cemeteries reached by its lines.

HOW EARLY SETTLERS MADE MEAL.

The sturdy pioneers who settled this western country had to make up in ingenuity what they lacked in machinery. An

First American Grist Mill.

old magazine cut reproduced in the American Miller shows the process by which all the corn meal was made for many years. The artist who engraved the picture evidently was thinking of an elephant when he drew the deer.

MARRIED BY TELEPHONE.

A wedding by long distance telephone occurred in Kentucky a few days ago, in which the toll charges were $23. The bride was Mrs. Gertrude Hallagher, a beautiful young widow of Dayton, Ky.; the groom, Theodore Cohen, a wealthy merchant of Hopkinsville, Ky.

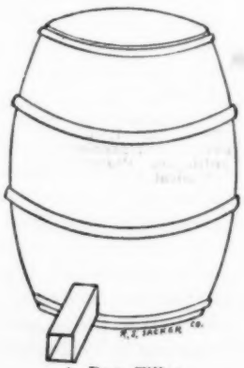
When the couple joined each other the next day as husband and wife, it was their first meeting. During the wedding ceremony there was a minister at each end of the 'phone. The bride, attired in becoming costume, went to the drug store of A. G. Goetz, at Dayton, accompanied by her father, a sister and many guests. The party took seats around the telephone booth. At 8:30 o'clock p. m. the Rev. R. D. Harding took the receiver from the hook and asked for Hopkinsville, Ky. The bridegroom answered. The minister propounded the usual questions to him, after which the blushing bride entered the booth and answered questions propounded by the minister at the other end of the line. The minister at Hopinsville was unused to such an instrument and compelled the bride to answer each question an indefinite number of times.

QUEEREST WOOD IN THE WORLD.

The strangest, most contrary wood in the world is redwood, which grows on the Pacific Coast. It will sink like a stone; it will float like a cork. It is soft and will cut like cheese; it is hard, flinty and brittle. Boards 12 inches wide and 10 feet long have been easily split, while other specimens were so crooked they could hardly lie still. Some redwood will defy rot for forty years, while some will decay in a few months. Some will lose three-fifths of its green weight in drying and some will not lose any weight. It is found straight-grained, or it may vie with rosewood, mahogany or French walnut for beauty of figure. Name any quality in redwood and its opposite can easily be found.

A HANDY BAG FILLER.

A home-made device for filling bags with flour, meal, bran or other ground stuff is shown in the American Miller. A hole six inches square is cut near the bottom of a



A Bag Filler.

flour barrel and a square spout 10 inches long inserted. This will be found a very much quicker method than filling small sacks from the bin.

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PURE FOOD LAWS OF MEXICO.

The pure food laws of Mexico provide that milk must always be sold without the addition of water or any other substance and when it is not from the cow, the kind of animal from which it has been drawn must be mentioned; milk from which the butter-producing component has been removed, wholly or in part, will be sold under the name of skimmed milk at special stands at which no other milk is sold; the only substance sold under the name of butter shall be the fat extracted from pure milk drawn from healthy animals and prepared in such manner that it shall not contain more than 5 per cent of water and at the most 2.5 per cent of the other component of milk—nevertheless the addition of salt (chloride of sodium) when the article is sold as salted butter, and of some inoffensive coloring matter, shall be permitted; the use of any other mineral substance except salt (sodium chloride) in the making of bread and buns is forbidden; bread and buns shall never be colored yellow with any other matter except the egg.

AFFILIATED WITH ARMOUR INSTITUTE.

The American School of Correspondence is to co-operate with the Armour Institute of Technology. The instruction papers and methods of the Correspondence School have been examined by the Institute faculty and approved. Dr. Frank Gunsaulus, president of the Institute, becomes chairman of the Correspondence School advisory board and students entering the institute are given credit for work done in the American school.

HARD LIFE OF CHINESE PRINTER.

The Chinese language is derived from 214 root-words, which expand into 4,000 or 5,000 words of daily use and the thirty-odd thousand of the dictionary. It requires 11,000 spaces to hold a font of Chinese type. The large cases, or false partitions, are ranged about the Chinese composing room and divided into spaces for each individual type, each a word complete in itself. A Chinese printer, it is estimated, can arrange 4,000 characters a day.

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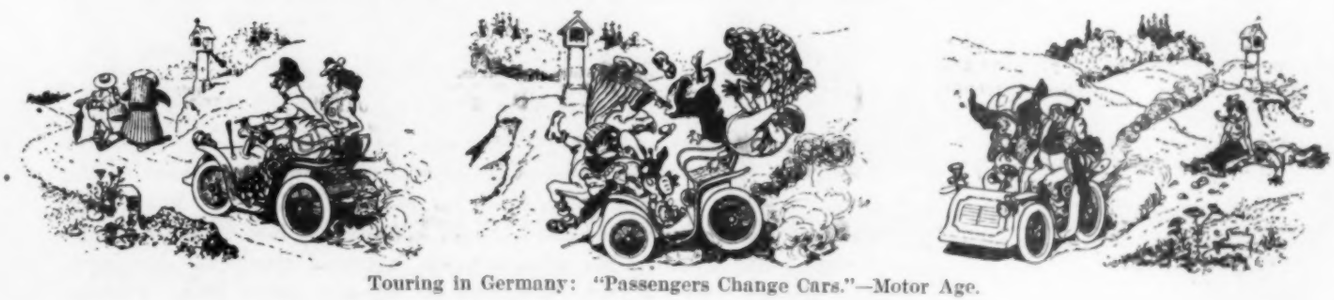
The monkey wrench gets its name from its inventor, Thomas Monkey of Bordentown, N. J.



Touring in Germany: "Passengers Change Cars."—Motor Age.

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Attractions for Next Week.

Does anybody really know anything? Since the beginning of the world scientific dogmas and creeds have been taught and studied as facts only to be denied by succeeding generations. The man spends his youth studying a philosophical principle only to learn that it is all wrong when he is grown. Once the schools taught that a body weighing two pounds would fall to the earth twice as fast as a body weighing one pound; Galileo upset this theory. Once the student was taught that the world was flat and bounded by unknown seas. Columbus shattered that theory.

We have been taught that the moon was a vast waste, lifeless, without air or moisture. Now comes Prof. Pickering of Harvard and tells us that the moon has life, air and moisture. Read about it in next week's Popular Mechanics. The law of attraction, said to have been discovered by Newton, is now declared to be all wrong and the problem of the revolution of the planets is said to be truthfully solved in the Morelian theory which simply reverses the Newton theory and is called the law of propulsion; in other words it teaches that planets do not attract but repel. This too will be told about next week. It is the same in all other lines. The physician is taught to cure a disease by a certain process, which he finds to be exactly wrong by a later discovery; foods we have been eating during our youth are suddenly discovered to be poisonous.

Did you know that the United States is raising and protecting seals for other nationalities to slaughter, and will not permit any of her own people to disturb them? We will tell about it next week. The charges of traffic in horse meat have become so serious in Chicago that an investigation is to be made. Other things to be mentioned next week will be a railroad with not a particle of wood in its construction; the charge of a congressman that Canadian railways aid in smuggling Chinamen into the United States; and about forty more articles the most interesting we can learn about between now and the time of going to press. They will be written so you can understand them.

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One newsdealer in Chicago who started with 5 copies a week in February last increased his sales to over 300 copies a week during April, and will average 400 a week for May. He is a very busy man; did not push the paper or ask a single customer to buy one. He keeps 8 copies displayed in his window; has a crowd there all day long. The display does the rest. Write us for window poster free. Popular Mechanics, Journal Bldg., Chicago.